

CLAIMS

1. A protection path setup method comprising the steps of:

(a) setting up a working path from a start-point node to an end-point node; and

(b) setting up a plurality of protection paths by taking a plurality of nodes on said working path as respective start points at the time of setting up said working path.

2. A method according to claim 1, wherein

step (a) includes the substeps of:

transferring a working path setup request message containing therein a protection path request from a start point to an end point of said working path along a route of said working path being set up; and

setting up said working path by transferring a working path setup response message from the end point to the start point of said working path in response to said working path setup request message, and

step (b) includes the substeps of:

transferring a protection path setup request message from a start point to an end point of each of said plurality of protection paths in response to said protection path request contained in said working path setup request message; and

setting up each of said plurality of protection paths by transferring a protection path setup response message from the end point to the start point of said each protection path in response to said protection path setup request message.

3. A method according to claim 2, wherein said protection path setup request message is sent out from each node after said each node has received said working path setup response message.

4. A method according to claim 3, wherein

step (b) further includes the substeps of:  
sending a result notification from said

end-point node of said working path to an upstream adjacent node along said working path; and  
notifying the completion of said protection path setup to said start-point node of said working path, by each node on said working path sequentially passing said result notification on to an upstream adjacent node along said working path after receiving both said result notification and said protection path setup response message for the protection path set up with said each node as the start point.

5. A method according to claim 3, wherein step (b) further includes the substep of determining whether a portion of a protection path about to be set up can share a bandwidth with some other protection path.

6. A method according to claim 3, wherein step (b) further includes the substep of estimating a delay along a route from the start point to the end point of said working path, including the protection path about to be set up, at the end-point node of said protection path.

7. A method according to claim 3, wherein step (a) further includes the substep of appending at each node an identifier of said each node to said working path setup response message, thereby making it possible to set up a protection path across an area border.

8. A method according to claim 1, further comprising the steps of:

(c) releasing said plurality of protection paths that have been set up in step (b); and

(d) releasing said working path that has been set up in step (a).

9. A node apparatus comprising:

means for setting up a working path with its own node as a start point; and

means for setting up a protection path with its own node as a start point during the setting up of said working path.

10. A node apparatus according to claim 9, wherein

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5                   said working path setup means includes:  
                  means for sending out a working path setup  
request message containing therein a protection path  
request for delivery to an end point of said working path  
along the route of said working path being set up; and  
                  means for setting up said working path by  
receiving a working path setup response message returned  
in response to said working path setup request message,  
and

10                   said protection path setup means includes:  
                  means for sending out a protection path  
setup request message; and  
                  means for setting up said protection path  
by receiving a protection path setup response message  
15                   returned in response to said protection path setup  
request message.

11. A node apparatus according to claim 10, wherein  
said protection path setup request message is sent out  
after receiving said working path setup response message.

20                   12. A node apparatus according to claim 10, wherein  
said protection path setup means further includes means  
for determining whether a portion of the protection path  
about to be set up can share a bandwidth with some other  
protection path.

25                   13. A node apparatus according to claim 9, further  
comprising:

                  means for releasing said protection path  
set up by said protection path setup means; and  
                  means for releasing said working path set  
30                   up by said working path setup means.

                  14. A node apparatus comprising:  
                  means for setting up a working path  
passing through its own node; and  
                  means for setting up a protection path  
35                   with its own node as a start point during the setting up  
of said working path.

15. A node apparatus according to claim 14, wherein

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said working path setup means includes:  
means for transferring a working path  
setup request message containing therein a protection  
path request and being forwarded from a start point  
toward an end point of said working path along the route  
of said working path being set up; and

means for setting up said working path by  
transferring a working path setup response message being  
returned from the end point toward the start point of  
said working path in response to said working path setup  
request message, and

said protection path setup means includes:  
means for sending out a protection path  
setup request message in response to said protection path  
request contained in said working path setup request  
message; and

means for setting up said protection path  
by receiving a protection path setup response message  
returned in response to said protection path setup  
request message.

16. A node apparatus according to claim 15, wherein  
said protection path setup request message is sent out  
after receiving said working path setup response message.

17. A node apparatus according to claim 15, wherein  
said protection path setup means includes:

means for receiving a result notification  
being transferred from the end-point node of said working  
path; and

means for passing said result notification  
on to an upstream adjacent node along said working path  
after receiving both said result notification and said  
protection path setup response message.

18. A node apparatus according to claim 15, wherein  
said protection path setup means further includes means  
for determining whether a portion of the protection path  
about to be set up can share a bandwidth with some other  
protection path.

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19. A node apparatus according to claim 15, wherein said protection path setup means further includes means for estimating a delay along a route from the start point to the end point of said working path including the protection path about to be set up.

20. A node apparatus according to claim 15, wherein said working path setup means further includes means for appending an identifier of its own node to said working path setup response message, thereby making it possible to set up a protection path across an area border.

21. A node apparatus according to claim 14, further comprising:

means for releasing said protection path set up by said protection path setup means; and  
means for releasing said working path set up by said working path setup means.

22. A node apparatus comprising:

means for setting up a working path with its own node as an end point; and  
means for setting up a protection path with its own node as an end point during the setting up of said working path.

23. A node apparatus according to claim 22, wherein

said working path setup means includes:  
means for receiving a working path setup request message containing therein a protection path request and transmitted from a start point of said working path along the route of said working path being set up; and

means for setting up said working path by transmitting a working path setup response message toward the start point of said working path in response to said working path setup request message, and

said protection path setup means includes:  
means for receiving a protection path setup request message transmitted from a start point of said protection path in response to the protection path

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request contained in said working path setup request message; and

5 means for setting up said protection path by transmitting a protection path setup response message toward the start point of said protection path in response to said protection path setup request message.

24. A node apparatus according to claim 23, wherein said working path setup means further includes means for sending a result notification to an upstream adjacent  
10 node along said working path.

25. A node apparatus according to claim 23, wherein said working path setup means further includes means for appending an identifier of its own node to said working path setup response message, thereby making it possible  
15 to set up a protection path across an area border.

26. A node apparatus according to claim 22, further comprising:

means for releasing said protection path set up by said protection path setup means; and

20 means for releasing said working path set up by said working path setup means.

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